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REMARKS

Claims 1-31 are pending in the present application. Claims 7, 9, 23 and 25 are amended into independent form. Reconsideration of the claims is respectfully requested.

Amendments are made to the specification to update the status with the PTO serial numbers where appropriate in the specification as suggested by the Examiner. No new matter has been added by any of the amendments to the specification.

I. Allowable Subject Matter

The Office Action states that claims 7, 9, 23 and 25 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response, the claims have been rewritten to overcome this objection. Applicants thank Examiner LeChi Truong for the allowable subject matter.

II. Examiner Interview

Applicants have requested a telephone interview with Examiner LeChi Truong. The Applicant Initiated Interview Request Form was faxed on Wednesday, May 12, 2004, and multiple phone calls have been made in an attempt to schedule an interview with the Examiner prior to this response. Applicants thank Examiner LeChi Truong for contacting the Applicants' representative on Monday, May 24, 2004, to schedule the telephone interview for Tuesday, June 1, 2004.

III. 35 U.S.C. § 103, Alleged Obviousness Based on Kedem

The Office Action rejects claims 1, 5, 6, 8, 10-17, 21, 22, 24 and 26-31 under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Kedem et. al.* (U.S. Patent Number 5,968,184), hereinafter referred to as *Kedem*. This rejection is respectfully traversed.

As to independent claims 1, 15, 17, 28, 30 and 31, the Office Action states:

As to claim 1, *Kedem* teaches the invention substantially as claimed including a method for providing feature in a logical volume (logical volume, col 3, ln 1-10 and ln 45-60), comprising: a set of feature plug-in modules (the commands/ a maintenance command, col 2, ln 15-21/ col 3, ln 10-16), selecting (identifying to whether the command is to be applied to every logical volume of the physical device, col 4, ln 10-22), a first plurality of feature plug-in modules

(the command, col 3, ln 1-67), ordering (put commands are put at 110 into the commence queue for each of the physical disk drive elements. Thereafter, the commands are executed in order (col 3, ln 45-67), applying (applied, col 4, ln 10-22), a first volume (the first logical volume, col 4, ln 10-22). Kedem does not explicit teach step of the loading. However, Kedem teaches the step of receiving memory commands from the various host (col 3, ln 5-12). It would have been obvious to one the ordinary skill in the art at the time the invention was made to have included the loading step in Kedem's because the received commands would deliver the data associated with those commands to the appropriate disk drive elements. ...

As to claim 15, it is an apparatus claim of claim 1; therefore, it is rejected for the same reason as claim 1 above. ...

As to claims 17, 21, 22, 24, 26, 27, 28, 29, 30, 31, they are apparatus claims of claims 1-6, 8, 10, 11, 15, 16; therefore, they are rejected for the same reason as claims 1, 5, 6, 8, 10, 11, 15, 16 above.

Office Action dated March 17, 2004, pages 2-4.

Claim 1, which is representative of the other rejected independent claims 15, 17, 28, 30 and 31 with regard to similarly recited subject matter, reads as follows:

1. A method for providing features in a logical volume management system, comprising:
 - loading a set of feature plug-in modules;
 - selecting a first plurality of feature plug-in modules from the set of feature plug-in modules;
 - ordering the first plurality of feature plug-in modules; and
 - applying the first plurality of feature plug-in modules to a first volume.(emphasis added)

Kedem does not teach or suggest feature plug-in modules. Additionally, *Kedem* does not teach or suggest loading a set of feature plug-in modules. Further, *Kedem* does not teach or suggest selecting a first plurality of feature plug-in modules from the set of feature plug-in modules and ordering the first plurality of feature plug-in modules.

Kedem is directed toward a method and apparatus for directing maintenance commands to logical volumes of the physical disk drive unit so that maintenance commands need not be repeated for each logical volume to be affected. If a failure is received with regard to a logical volume, then the maintenance command is repeated for the failed logical volume. *Kedem* teaches that a user specifies a maintenance command, a logical volume to be affected and an option switch indicating whether the command should also be applied to each of the other logical volumes of the physical device. The

command is then sent to a disk director, which creates a separate command for each of the logical volumes specified. These commands are put into a command queue for each affected physical disk drive element of the specified logical volumes.

According to the TechEncyclopedia of The Business Technology Network (www.techweb.com/encyclopedia/defineterm?term=plug-in), a "plug-in" is an auxiliary program that works with a major software package to enhance its capability. For example a plug-in may be added to Web browsers to enable them to support audio or video content. A printout of this definition is attached. The specification states on page 1, line 31 through page 2, line 2, that the present invention provides a mechanism to write binary plug-in modules to expand the capabilities of a logical volume manager. Further, the specification states on page 10, lines 3-6, that the present invention provides a logical volume manager with a plug-in mechanism, which allows features to be dynamically added, removed, and modified. The term "plug-in" is well known in the art. A maintenance command is not an example of a plug-in module. The user specified maintenance command of *Kedem* is not an auxiliary program to enhance the capability of the method and apparatus of *Kedem*. To the contrary, the maintenance command of *Kedem* is a user input already supported by the mechanism of *Kedem*. It is just a command similar to a DOS command. It is not a plug-in module. Thus, *Kedem* does not teach or suggest a feature plug-in module, as recited in the claims of the present invention.

In the rejection of claim 1, the Office Action refers to the following portions of *Kedem* as allegedly teaching the features of claim 1:

In particular embodiments, the method features the steps of determining any failure mode in response to directing the maintenance command to the plural logical volumes and repeating the directing and automatically directing steps. The method then features limiting the step of directing the commands to only those logical volumes to which that maintenance command failed during a previous maintenance command operation.

Kedem, column 2, lines 15-21.

Referring to FIG. 1, the invention relates to a computer system 10 which has a plurality of host computers 12a, 12b, . . . , 12n and a mass storage system 13 having a plurality of physical disk drive elements 14a, 14b, . . . , 14k. Interconnecting the host computers 12 and the disk drive elements 14 is a disk

drive controller 16, for example, that made by EMC and known as the Symmetrix controller. The disk drive controller 16 receives memory commands from the various host computers over buses 18a, 18b, . . . , 18n respectively, for example, connected and operating in accordance with a SCSI protocol, and delivers the data associated with those commands to the appropriate disk drive elements 14 over respective connecting buses 20a, 20b, . . . 20k. Buses 20 also preferably operate in accordance with a SCSI protocol.

Each of the disk drive elements 14 typically has in excess of one gigabit of memory and is logically divided, in accordance with known techniques, into a plurality of logical volumes. Each disk drive element 14 can thus have a plurality of logical volumes, for example 4, 8, or more logical volumes on a single physical disk drive element. In a typical configuration, the controller system also connects to a console PC 22 through a connecting bus 24. Console PC 22 is used for maintenance and access to the controller and can be employed to set parameters of the controller as is well known in the art.

In operation of the disk drive system, it can often occur that a maintenance command which is applied to one logical volume of a physical device should also be applied to all logical volumes of at least that one physical disk drive device, and perhaps to a group of physical disk drive devices. For example, in preparing to take a disk drive off-line, the same command is typically sent to each logical volume. In accordance with the invention, the maintenance command, for example from the maintenance computer 22, can be configured to apply to each logical volume of a physical disk drive device, or group of devices, as desired. The system is particularly useful in connection with the Symmetrix disk drive controller system.

Referring to FIG. 2, within a disk controller 16 to which the invention is particularly useful, each host computer connects to a channel director 30 (also referred to as a SCSI adapter) over SCSI bus lines 18. Each channel director, in turn, connects over one or more system buses 32 or 34 to a global memory 36. The global memory preferably includes a large cache memory through which the channel directors can communicate with the disk directors 40, which in turn, control the disk drives 14.

Referring to FIG. 3, in a preferred embodiment of the invention, in operation, the user through the maintenance PC 22 specifies at 100 in a maintenance command a logical volume to be affected and an option switch (Sw1) (FIG. 4) indicating whether the command should also be applied to each of the other logical volumes of the physical device. The command is then sent, at 102, to the appropriate disk director which reads the command and creates, at 104, a separate logical volume instruction for each of the logical volumes specified. In this manner, the command is reliably applied, at 108, to each logical volume, and if desired, a separate group switch can be used in the command to identify either groups of physical devices to which the command is to be applied or specific physical disk drive elements to which the command would be applied. In either instance, the disk director creates the necessary commands to effect the maintenance command at each logical volume of each affected physical disk drive element. The commands are put, at 110, into the command queue for each of the

physical disk drive elements. Thereafter, the commands are executed, at 112, in order. If this is no failure, tested at 114, in executing any of the commands, the next maintenance or other commands in the command stack or queue for the disk drive are executed. (emphasis added)

Kedem, column 3.

These portions of *Kedem* only teach that a user specifies a maintenance command, a logical volume to be affected and an option switch indicating whether the command should also be applied to each of the other logical volumes of the physical device. The command is then sent to a disk director, which creates a separate command for each of the logical volumes specified. Each command is put into the appropriate command queue of the affected physical disk drive element for each specified logical volume. Nowhere in this, or any other, section of *Kedem* is there any teaching regarding a plug-in module to a logical volume management system. All that is taught is a user input command.

Claim 1 recites loading a set of feature plug-in modules. In the present invention as recited in claim 1, a set of feature plug-in modules, for example, a plug-in module that adds an encryption feature, a plug-in module that performs a drive linking feature, or a plug-in module that performs a remote mirroring feature, are loaded. The Office Action alleges that the user entered maintenance command of *Kedem* anticipates a set of feature plug-in modules. As discussed previously, a maintenance command is not a plug-in module and does not expand the capabilities of a logical volume management system. Nowhere in *Kedem* is there anything resembling a plug-in module.

The Office Action states that *Kedem* does not explicitly teach the step of the loading, but alleges that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the loading step in *Kedem* because the disk drive controller receives memory commands from the various host computers and delivers data associated with those commands to the appropriate disk drive elements. Applicants respectfully disagree with the allegation since receiving memory commands does not teach or suggest loading a set of feature plug-in modules. *Kedem* does not teach or suggest loading a set of feature plug-in modules but rather teaches receiving a user input command. Thus there would not be any reason to load a set of feature plug-in modules since they do not exist in the *Kedem* system.

Additionally, claim 1 recites selecting a first plurality of feature plug-in modules from the set of feature plug-in modules. For example, two of the three features from the above example, such as a drive linking feature plug-in module and a remote mirroring feature plug-in module, may be selected. The Office Action alleges that this step is taught by identifying whether a maintenance command is to be applied to every logical volume of the physical device. *Kedem* teaches that an option switch, which is a flag in a maintenance command record, indicates if the command is applied to every logical volume of the physical device. To the contrary, claim 1 recites selecting a first plurality of feature plug-in modules from the set of feature plug-in modules. *Kedem* does not teach or suggest the selecting step as recited in the claims of the present invention.

Further, claim 1 recites ordering the first plurality of feature plug-in modules. For example, if a drive linking feature plug-in module and a remote mirroring feature plug-in module were selected in the previous step, then the order of execution of these two plug-in modules is determined by this ordering step. The Office Action alleges that the ordering step is taught by putting each command that was created for a specified logical volume in the appropriate command queue for the affected physical disk drive elements. Separating commands into the appropriate queue does not teach or suggest an ability to order the maintenance commands, it merely teaches sending the commands to the appropriate place for them to be implemented. Furthermore, maintenance commands are not plug-in modules and there is no teaching of ordering plug-in modules in *Kedem*. Thus, *Kedem* does not teach or suggest the ordering step, as recited in claim 1 of the present invention.

In view of the above, Applicants respectfully submit that *Kedem* does not teach or suggest loading a set of feature plug-in modules, as recited in claims 1, 15, 17, 28, 30 and 31. At least by virtue of their dependency on claims 1, 15, 17 and 28, respectively, *Kedem* does not teach or suggest the features of dependent claims 5, 6, 8, 10-14, 16, 21-22, 24, 26-27 and 29. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 1, 5, 6, 8, 10-17, 21, 22, 24 and 26-31 under 35 U.S.C § 103(a).

In addition to the above, *Kedem* does not teach the specific features recited in dependent claims 5, 6, 8, 10-14, 16, 21-22, 24, 26-27 and 29. For example, with regard to claims 6 and 22, *Kedem* does not teach or suggest ordering the first plurality of feature

plug-in modules based on classification information. As stated previously, *Kedem* does not teach or suggest a step of ordering feature plug-in modules or maintenance commands. The Office Action alleges that this feature is taught by an option switch indicating whether a command should also be applied to each of the other logical volumes of the physical device. *Kedem* does not use an option switch to order maintenance commands. To the contrary, the option switch is used to determine which logical volumes will receive a maintenance command. *Kedem* does not teach or suggest the steps as recited in claims 6 and 22.

Additionally with respect to claims 8 and 24, *Kedem* does not teach or suggest ordering the first plurality of feature plug-in modules based on ordering attribute information in addition to the classification information. The Office Action alleges that this feature is taught by a separate groups option switch in a command and by identifying which command belongs to each logical volume. Again, *Kedem* does not teach or suggest a step of ordering feature plug-in modules or maintenance commands. *Kedem* only teaches using an option switch flag in a maintenance record to determine which logical volumes will receive a maintenance command. *Kedem* does not teach or suggest the steps as recited in claims 8 and 24.

In addition with respect to claims 12-14, *Kedem* does not teach or suggest selecting, ordering, and applying a second set of feature plug-in modules to a second volume. As discussed previously, *Kedem* does not teach or suggest plug-in modules or selecting and ordering a set of feature plug-in modules.

Thus, in addition to being dependent on their respective independent claims, dependent claims 5, 6, 8, 10-14, 16, 21-22, 24, 26-27 and 29 are also distinguished over the *Kedem* reference based on the specific features recited therein. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 5, 6, 8, 10-14, 16, 21-22, 24, 26-27 and 29 under 35 U.S.C. § 103(a).

IV. 35 U.S.C. § 103, Alleged Obviousness Based on *Kedem* and APA

The Office Action rejects claims 2-4 and 18-20 under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Kedem* in view of alleged Admitted Prior Art (APA). This rejection is respectfully traversed.

Since claims 2-4 and 18-20 depend from independent claims 1 and 17, respectively, the same distinctions between *Kedem* and the invention recited in claims 1 and 17, apply to dependent claims 2-4 and 18-20. In addition, the alleged *APA* does not provide for the deficiencies of *Kedem* with regard to independent claims 1 and 17. The alleged *APA* describes a Logical Volume Manager (LVM) subsystem. The alleged *APA* is cited for disclosing that a logical volume may contain one or more partitions and partitions can be combined into an aggregate. The alleged *APA* does not teach or suggest the feature of loading a set of feature plug-in modules or the feature of selecting a first plurality of feature plug-in modules from the set of feature plug-in modules, as recited in claims 1 and 17. Thus, any alleged combination of the alleged *APA* with *Kedem* still would not result in the invention recited in claims 1 and 17 from which claims 2-4 and 18-20 depend. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 2-4 and 18-20 under 35 U.S.C. § 103(a).

In addition to the above, *Kedem* and the alleged *APA* do not teach the specific features recited in dependent claims 2-4 and 18-20. *Kedem*, the alleged *APA*, and the combination of *Kedem* and the alleged *APA*, do not teach or suggest selecting the first plurality of feature plug-in modules based on the logical volume manger data associated with at one aggregate of a first volume, as recited in claims 2 and 18. Additionally, *Kedem*, the alleged *APA*, and the combination of *Kedem* and the alleged *APA*, do not teach or suggest selecting the first plurality of feature plug-in modules based on the logical volume manger data associated with at least one partition of a first volume, as recited in claims 4 and 20. In addition, *Kedem*, the alleged *APA*, and the combination of *Kedem* and the alleged *APA*, do not teach or suggest selecting the first plurality of feature plug-in modules based on the logical volume manger data associated with at least one aggregate and at least one partition of a first volume, as recited in claims 3 and 19.

Thus, in addition to being dependent on their respective independent claims, claims 2-4 and 18-20 are also distinguished over the *Kedem* and the alleged *APA* references based on the specific features recited therein.

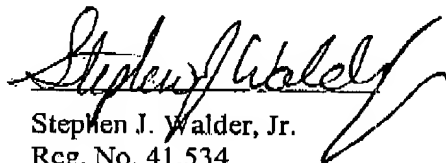
V. Conclusion

It is respectfully urged that the subject application is patentable over the cited references and is now in condition for allowance. The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

Respectfully submitted,

DATE:

May 24, 2004



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plug-in

An auxiliary program that works with a major software package to enhance its capability. For example, plug-ins are widely used in image editing programs such as Photoshop to add a filter for some special effect. Plug-ins are added to Web browsers to enable them to support new types of content (audio, video, etc.). The term is widely used for software, but could also be used to refer to a plug-in module for hardware. See [plug-inless](#).

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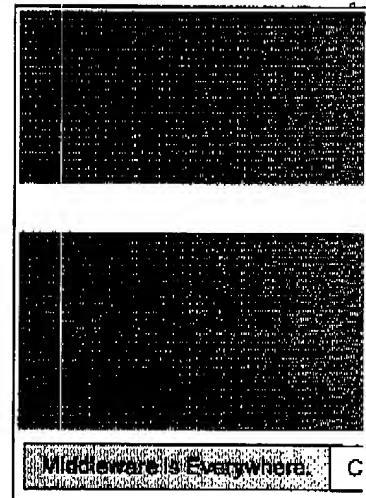
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